

CLAIMS

What is claimed is:

1. A compound comprising:

a polymeric chain; and

an acid labile group attached to the polymeric chain at an anhydride linkage.
2. The compound of claim 1, wherein the anhydride linkage comprises two acyl groups bonded to an oxygen atom, wherein a first of the two acyl groups is attached to the polymeric chain, and wherein a second of the two acyl groups is attached to the acid labile group.
3. The compound of claim 2, wherein at least one of the acyl groups comprises a carbonyl group.
4. The compound of claim 1, wherein the anhydride linkage comprises two carbonyl groups bonded to an oxygen atom, wherein a first of the two carbonyl groups is attached to the polymeric chain, and wherein a second of the two carbonyl groups is attached to the acid labile group.
5. The compound of claim 1, wherein the anhydride linkage comprises sulfur.
6. The compound of claim 5, wherein the anhydride linkage comprises a sulfonic acyl group.
7. The compound of claim 5, wherein the anhydride linkage comprises a sulfinic acyl group.
8. The compound of claim 5, wherein the anhydride linkage comprises two acyl groups bonded to a sulfur atom.

9. The compound of claim 1, wherein the anhydride linkage comprises phosphorous.
10. The compound of claim 9, wherein the anhydride linkage comprises a phosphoryl acyl group.
11. The compound of claim 1, wherein the acid labile group comprises an alicyclic group.
12. The compound of claim 11, wherein the alicyclic group comprises a ring selected from an alkylated monocyclic ring and an alkylated polycyclic ring.
13. The compound of claim 12, wherein the alicyclic group comprises a group selected from methyl cyclopentyl, methyl cyclohexyl, methyl adamantyl, and norbornyl.
14. A composition comprising:

the compound of claim 1; and

a radiation sensitive acid generator capable of generating an acid if exposed to radiation.
15. A method comprising:

forming a layer of the composition of claim 14 over a substrate;

exposing the layer to patterned radiation;

heating the exposed layer; and

developing the exposed layer.
16. A compound comprising:

- a polymeric chain;
- a dissolution inhibitor attached to the polymeric chain at an anhydride linkage.
17. The compound of claim 16, wherein the anhydride linkage comprises two acyl groups bonded to an oxygen atom, wherein a first of the two acyl groups is attached to the polymeric chain, and wherein a second of the two acyl groups is attached to the dissolution inhibitor.
18. The compound of claim 16, wherein the anhydride linkage comprises sulfur.
19. The compound of claim 16, wherein the anhydride linkage comprises phosphorous.
20. A composition comprising on a solvent-dry basis:
- from 80 to 99.9 weight percent of the compound of claim 16; and
- from 0.1 to 20 weight percent of a photoacid generator.
21. A method comprising:
- applying a layer of the composition of claim 20 over a substrate;
- heating the layer;
- exposing the layer to patterned radiation by transmitting actinic radiation to the layer through a patterned mask;
- heating the exposed layer; and
- after said heating, developing the exposed layer by contacting the exposed layer with a developer and then removing the developer.

22. A composition comprising:
- a radiation sensitive acid generator capable of generating an acid if exposed to radiation; and
- a compound including:
- a polymeric chain; and
- an acid labile group attached to the polymeric chain by an anhydride linkage, wherein the acid labile group is capable of detaching from the polymeric chain by reacting with the acid in the presence of water.
23. The composition of claim 22, wherein the anhydride linkage comprises two acyl groups bonded to an oxygen atom, wherein a first of the two acyl groups is attached to the polymeric chain, and wherein a second of the two acyl groups is attached to the acid labile group.
24. The composition of claim 23, wherein at least one of the acyl groups comprises a carbonyl group.
25. The composition of claim 22, wherein the anhydride linkage comprises an element selected from sulfur and phosphorous.
26. A method comprising:
- applying a layer of the composition of claim 22 over a substrate;
- heating the layer;
- exposing the layer to patterned radiation by transmitting actinic radiation to the layer through a patterned mask;

heating the exposed layer; and

after said heating, developing the exposed layer by contacting the exposed layer with a developer and then removing the developer.

27. A method comprising:

applying a layer of a composition over a substrate;

heating the layer;

exposing the layer to patterned radiation by transmitting actinic radiation to the layer through a patterned mask;

generating an acid by photolysis of a radiation-sensitive acid generator of the composition with the actinic radiation;

heating the exposed layer;

detaching an acid labile group from a polymeric chain of the composition by cleaving an anhydride linkage in a hydrolysis reaction catalyzed by the acid; and

after said heating the exposed layer, developing the layer by contacting the layer with a developer, dissolving the detached group in the developer, dissolving the polymeric chain in the developer, and removing the developer.

28. The method of claim 27, further comprising, after said detaching the acid labile group, and before said developing the layer, forming a hydrogen bond between an acid functionality of the detached group and an oxygen-containing group of the polymeric chain.

29. The method of claim 28, wherein said forming the hydrogen bond occurs during said exposure, and wherein said exposure includes a vacuum exposure.
30. The method of claim 27, further comprising, during development, reacting an acid functionality of the detached group with a base of the developer.